

REMARKS/ ARGUMENTS

All of the cancelled claims were found to be novel but an inventive step objection was raised in respect of EP 0359373 (FSK KABUSHIKI KAISHA) and WO 03/049164 & US2004/0048419 (DISCO CORPORATION) in the International Preliminary Examination Report. However, it appears from the IPER that the International Examiner has not understood and taken into account the two separate adhesive layers now claimed.

Thus FSK KABUSHIKI KAISHA appears to disclose a single adhesive layer which comprises a (meth)acrylate polymer, an epoxy resin, a photopolymerizable low molecular weight compound, a heat activatable potential curing agent for the epoxy resin and a photopolymerization initiator for the photopolymerizable low molecular weight compound (FSK KABUSHIKI KAISHA abstract; page 3 lines 41-44; Fig. 1). The single adhesive layer of FSK KABUSHIKI KAISHA preferably has an initial high adhesion to the base sheet of the adhesive tape, which high adhesion can be reduced by irradiation, such as by an electron beam or ultraviolet radiation (FSK KABUSHIKI KAISHA page 3 line 33), to a lower adhesion to the base sheet than to the die (FSK KABUSHIKI KAISHA page 3 lines 27-30). A wafer is mounted, apparently active face up, on the adhesive side of the adhesive tape (FSK KABUSHIKI KAISHA page 5 line 27, Fig. 2) and the wafer and at least 50%, preferably 100%, of the single adhesive layer are diced with "a suitable dicing means such as a dicing saw" (FSK KABUSHIKI KAISHA page 5 lines 28-31, Fig. 3). The single adhesive layer is irradiated, through the base sheet, with an energy beam, preferably ultraviolet, to polymerize or cure the photopolymerizable compound (FSK KABUSHIKI KAISHA page 5 lines 37-40), thereby increasing the adhesion of the single adhesive layer to the die well above the adhesion of the single adhesive layer to the base sheet of the adhesive tape – apparently due to the epoxy resin in the adhesive (FSK KABUSHIKI KAISHA page 5 lines 48-50). The wafer chips are then picked up from the base sheet with a portion of the cured single adhesive layer attached, which is no longer sticky (FSK KABUSHIKI KAISHA page 5 lines 51-58; Figs. 5-6). The chips with a portion of a now non-adhesive single adhesive layer attached are placed on a lead frame and heated for up to two hours so as to cause the cured portions of the single adhesive layer to again develop tackiness to adhere to the chip and lead frame with an approximately equal adhesive strength (FSK KABUSHIKI KAISHA page 6 lines 7-14; Fig. 7).

Thus, FSK KABUSHIKI KAISHA discloses little more than the prior art process of DAF dies acknowledged in the present application (page 1 lines 4-24; Fig. 1).

Clearly stringent requirements are required of the formulation of the single adhesive layer of FSK KABUSHIKI KAISHA to perform multiple successive functions (FSK KABUSHIKI KAISHA page 3 line 41 – page 5 line 22).

This may be contrasted with the claimed process of the present invention in which a wafer with a second adhesive layer is adhered to a carrier base by a first adhesive layer between the second adhesive layer and the base, the wafer and first and second adhesive layers are diced by laser machining, the first adhesive layer is cured to release the die with a portion of the second adhesive layer attached, the die are picked up and placed on a die pad and the portion of the second adhesive layer cured to attach the die to the die pad.

The IPER asserts that although laser dicing is not disclosed in the process of FSK KABUSHIKI KAISHA, laser dicing is known from DISCO CORPORATION and therefore the skilled person would combine laser dicing from DISCO CORPORATION with the single adhesive layer process of FSK KABUSHIKI KAISHA. DISCO CORPORATION (US citation), discloses a wafer adhered by a “front side” to a support disk by an adhesive layer, grinding the back surface of the wafer, applying the wafer and ground disk to an adhesive tape with the ground side facing the adhesive tape, reducing the adhesion of the adhesive layer to remove the disk and adhesive layer and dicing the wafer on the adhesive tape (DISCO CORPORATION paragraph [0007]). Contrary to the assertion in the IPER, we can find no disclosure in DISCO CORPORATION of dicing of either the adhesive layer or the adhesive tape, and therefore, we submit, the person skilled in the art would not learn from DISCO CORPORATION that the adhesive layer of FSK KABUSHIKI KAISHA could be diced by a mechanical saw or a laser.

Moreover, even if it were known that existing adhesive films can be laser machined, there is no suggestion in either FSK KABUSHIKI KAISHA or DISCO CORPORATION that the specially formulated UV or electron beam sensitive and heat sensitive single adhesive layer of FSK KABUSHIKI KAISHA would be susceptible to laser machining and still retain all its special properties of being successively adhesive to the wafer and base sheet, non-adhesive to the base sheet but adhesive to the wafer chip and adhesive to the wafer chip and lead frame.

Moreover, even if the single adhesive layer process of FSK KABUSHIKI KAISHA were combined with the laser dicing of DISCO CORPORATION, this would not suggest or hint at the two adhesive layer, laser dicing process of the claimed invention, which has clear advantages in the use of simple adhesive layers, in which the second adhesive layer may be a known DAF (page 5 line 5) and of laser dicing over mechanical saw dicing (page 5 lines 5-8). Moreover, different dicing laser beam profiles may be used for the different layers (page 5 line 14-21) and, if desired, dicing of the wafer may be completed before dicing of an adhesive layer (page 5 lines 29-32).

Better to clarify the difference between the single adhesive layer of FSK KABUSHIKI KAISHA and the two adhesive layer of the present invention, the new independent claims have been amended to: “... adhered to the carrier base means by a first adhesive between the carrier base (13) and the adhesive layer (12); laser machining through the wafer substrate, the first adhesive and through the adhesive layer ...” such an amendment having basis in the application as filed at page 6 lines 27-28 and implicit in the feature that the laser machining “no more than at most scribe(s) the carrier base means” and therefore must at most machine through both the first adhesive and the adhesive layer.

The IPER further asserts that the features of claim 2 of using different laser beam profiles for different layers is known from DISCO CORPORATION paragraph [0075], and yet the cited paragraph states only that the disclosed process can be used with a dicing machine using a rotary blade or a laser. There is no hint or suggestion in DISCO CORPORATION of machining different layers, and therefore definitely no hint or suggestion using different laser beam profiles for different layers of wafer substrate, adhesive layer and carrier base means as

claimed in claims 2 and 3. Similarly, contrary to the assertion in the IPER, there is no disclosure in DISCO CORPORATION of the scanning and control means of claim 17.

In view of the amendments made to the claims and the remarks made, it is respectfully submitted that allowable subject matter has been defined.

Accordingly, early allowance of the subject application is earnestly requested. If the Examiner should have any queries, he is invited to contact the undersigned.

Respectfully Submitted

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